

REMARKS

Claims 3-22 are pending, with claims 1 and 2 being withdrawn from consideration by the January 10, 2001 Restriction Requirement. By this Amendment, claim 3 is amended. It is respectfully submitted that no new matter is introduced by this Amendment.

Reconsideration of claims 3-22 in view of the foregoing amendments and the following remarks is respectfully requested.

I. CLAIMS 3-5 DEFINE PATENTABLE SUBJECT MATTER

A. Item 3 of the Office Action rejects 3-5 under 35 U.S.C. §103(a) over U.S. Patent 5,827,343 to Engelke. This rejection is respectfully traversed. The Office Action asserts that Engelke renders obvious the features of claims 3-5. However, it is respectfully submitted that Engelke does not disclose a method for producing a thin film structure comprising the steps of: forming on a substrate a thin film made of amorphous material having a supercooled liquid phase region, heating the thin film to a temperature within the supercooled liquid phase region and thereby deforming the thin film to a given shape without the use of an external force, and cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming a thin film structure, as claimed in claim 3.

Engelke discloses only heating the composite made of a glass material and a semiconductor material or metal at a room temperature between $250 - (T_g - 10) ^\circ\text{C}$, as shown at column 3, lines 26-31. It appears that the Office Action is attempting to equate T_g with the melting point of the material. However, it is respectfully submitted that T_g is the glass transition temperature. Therefore, it is respectfully submitted that Engelke performs the heating treatment at a condition below the glass transition temperature. Thus, the glass of the composite does not exhibit the viscous flow in a viscosity of $10^8 - 10^{13} \text{ Pa}\cdot\text{s}$.

As shown in Engelke at column 3, lines 8-24, the bending direction of the composite is changed by taking advantage of using the difference in thermal expansion coefficient between the glass plate 1 and the silicon plate 2. This disclosure is different from the claimed invention -- since the glass plate does not exhibit the viscous flow, the glass plate cannot be deformed by its own weight. Also, as claimed in the claimed invention, an amorphous material having a supercooled liquid phase region is heated up to a temperature within 200°C to 600°C, which is a typical supercooled liquid phase region, wherein it exhibits its viscosity of about $10^8 - 10^{13}$ Pa•S., as described on page 3, lines 12-18 of the specification.

In this invention, if the amorphous material having the supercooled liquid phase region is heated up to a temperature near its softening point, it is fluidized and cannot be retained in its configuration and thus, cannot be deformed by a mechanical force in a given shape.

In view of the foregoing discussions, it is respectfully submitted that Engelke does not teach or suggest the subject matter of independent claim 3. Thus, Engelke cannot teach or suggest the subject matter of claims 4 and 5 due to their dependency upon claim 3. Accordingly, withdrawal of the rejections under 35 U.S.C. §103(a) of claims 3-5 is respectfully submitted.

B. The Office Action rejects claims 6, 7 and 9-22 under 35 U.S.C. §103(a) as being unpatentable over Engelke in view of U.S. Patent 5,994,159 to Aksyuk et al. This rejection is respectfully traversed.

The Office Action asserts that the combination of Engelke and Aksyuk disclose the subject matter of claims 6, 7 and 9-22. However, it is respectfully submitted that Aksyuk does not make up for the deficiencies discussed above with respect to Engelke.

As mentioned in the Office Action, Aksyuk teaches a method of fabricating a thin film structure for a micro-mechanical device in which the thin film beam 8 is deformed by

external mechanical force. However, Aksyuk does not teach, suggest or disclose a method for producing a thin film structure comprising the steps of: forming on a substrate a thin film made of an amorphous material having a supercooled liquid phase region, heating the thin film to a temperature within the supercooled liquid phase region and thereby deforming the thin film to a given shape without the use of an external force, as claimed in claim 3.

Accordingly, it is respectfully submitted that due to their dependency upon claim 3, claims 6, 7 and 9-22 are also allowable. Withdrawal of the rejection of claims 6, 7 and 9-22 under 35 U.S.C. §103(a) as being unpatentable over Engelke in view of Aksyuk is respectfully requested.

C. Item 4 of the Office Action rejects claim 8 under 35 U.S.C. §103(a) as being unpatentable over Engelke in view of Aksyuk and further in view of European Patent EP 0 762 176 A2 to Tregilgas et al. This rejection is respectfully traversed.

The Office Action asserts that the combination of Engelke, Aksyuk and Tregilgas discloses the subject matter of claim 8. However, it is respectfully submitted that Tregilgas does not make up for the deficiencies discussed above with respect to Engelke and Aksyuk.

Tregilgas teaches a method of producing a thin film structure by forming a beam 24 (see Fig. 3F) of an amorphous conductive material. See column 1, lines 49-53. However, nowhere does Tregilgas discuss an amorphous material having a supercooled liquid phase region that is heated to a temperature within 200°C - 600°C. Additionally, Tregilgas does not discuss heating the thin film to a temperature within the supercooled liquid phase region to deform the thin film to a given shape without the use of an external force, as claimed in independent claim 3.

In view of the foregoing discussions, it is respectfully submitted that the combination of Engelke, Aksyuk and Tregilgas does not teach, suggest or disclose the subject matter of independent claim 3. Therefore, due to its indirect dependency upon claim 3, claim 8 is also

allowable. Accordingly, withdrawal of the rejection of claim 8 under 35 U.S.C. §103(a) in view of Engelke, Aksyuk and Tregilgas is respectfully requested.

D. Item 6 of the Office Action rejects claims 3-5 under 35 U.S.C. §103(a) as being unpatentable over "Suparplastic Micro-forming Microstructures", written by Saotome et al. This rejection is respectfully traversed.

The Office Action asserts that Saotome renders obvious the features of claims 3-5. However, it is respectfully submitted that Saotome does not disclose a method for producing a thin film structure comprising the steps of: forming a substrate on a thin film made of an amorphous material having a supercooled liquid phase region, heating the thin film to a temperature within the super cool liquid phase region and thereby deforming the thin film to a given shape without the use of an external force and cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming the thin film structure, as claimed in claim 3.

Saotome discloses a method for micro-forming a material using a V-grooved die. As shown on page 344, Col. 1, micro-forming is carried out with a specially developed apparatus that enables a load control from 300 - 100 MPa in a compression punch stress and a punch speed from about .001 - 0.1 mm/s. Thus, as one can see from this disclosure, contrary to the claimed invention, the material is deformed using the weight of the press.

Accordingly, in view of the foregoing discussions, it is respectfully submitted that Saotome does not teach or suggest the subject matter of independent claim 3. Thus, Saotome cannot teach or suggest the subject matter of claims 4 and 5 due to their dependency upon claim 3. Accordingly, withdrawal of the rejections under 35 U.S.C. §103(a) of claims 3-5 is respectfully requested.

E. Item 7 of the Office Action rejects claims 6, 7 and 9-22 under 35 U.S.C. §103(a) as being unpatentable over Saotome in view of Aksyuk. This rejection is respectfully traversed.

It is respectfully submitted that the combination of Saotome and Aksyuk fails to disclose the subject matter of claims 6, 7 and 9-22 for the reasons set forth above in paragraph B of these remarks.

Accordingly, withdrawal of the rejection of claims 6, 7 and 9-22 under 35 U.S.C. §103(a) in view of Saotome and Aksyuk is respectfully requested.

F. Item 8 of the Office Action rejects claim 8 under 35 U.S.C. §103(a) as being unpatentable over Saotome in view of Aksyuk and further in view of Tregilgas. This rejection is respectfully traversed based on the same reasons set forth above in paragraph C of these remarks.

Accordingly, withdrawal of the rejection of claim 8 under 35 U.S.C. §103(a) as being unpatentable over Saotome, Aksyuk and Tregilgas is respectfully requested.

II. CONCLUSION

In view of the foregoing amendments and remarks, it is respectfully submitted that claims 3-22 are in condition for allowance.



Application No. 09/556,795

Should the Examiner believe that anything further would be desirable in order to place this application in better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below.

Respectfully submitted,

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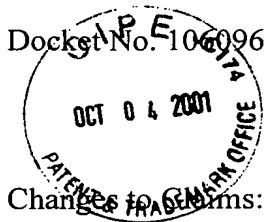
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Attachment:
Appendix

Date: October 4, 2001

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DEPOSIT ACCOUNT USE
AUTHORIZATION
Please grant any extension
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APPENDIX

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The following is a marked-up version of the amended claim:

3. (Twice Amended) A method for producing a thin film-structure comprising the steps of:

forming on a substrate a thin film made of an amorphous material having a supercooled liquid phase region,

heating the thin film to a temperature within the supercooled liquid phase region and thereby deforming the thin film to a given shape without the use of an external force, and

cooling the thin film to room temperature from the temperature within the supercooled liquid phase region to stop deforming the thin film and thereby forming the thin film-structure.